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ABSTRACT

A study examined the effects of training in a self-generated learning strategy on students' ability to comprehend text and self-monitor their understanding while engaging in strategic text processing. The study also explored the extent to which grade level and passage difficulty interacted with training to produce treatment effects. Subjects, 36 fourth grade and 36 sixth grade students in four classrooms in the same small rural northeastern elementary school, were randomly divided by classroom into control and experimental groups of equal size. Subjects in the experimental groups were trained in the use of a learning strategy which encompassed self-generated questioning prior to and during the reading of text, while subjects in the control group spent an equal amount of time receiving instruction in identifying main ideas. Factors such as teacher variable, initial differences in the ability levels of the subjects, and the time of day of the instruction were held constant. Posttest results indicated that treatment did manipulate metacomprehension skills and resulted in increased comprehension and retention of prose. (Seven tables of data are included; 20 references, appendixes describing the learning strategy, and posttest instruments are attached.) (RS)

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The Effects of Training in a Self-Generated Learning Strategy on the Prose-Processing Abilities of Fourth and Sixth Graders

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The Effects of Training in a Self-Generated Learning Strategy on the Prose-Processing Abilities of Fourth and Sixth Graders

An important issue for elementary teachers, reading specialists and researchers has been the concern for the comprehension abilities of upper elementary students (grade four through six). In the past decade our knowledge of the basic cognitive and instructional processes involved in reading comprehension has grown appreciably. However, empirical support for translation of this knowledge base into effective instructional practices has been limited. (Paris, 1987).

Recently there has been a change in orientation from behaviorist to cognitivist theories of learning. An outgrowth of this cognitive emphasis has been an interest in the role of learning strategies as a means of reading comprehension instruction. Learning strategies refer to those behaviors and thoughts that a learner engages in during learning which are intended to enhance the learner's encoding process (Weinstein and Mayer, 1986). A wealth of instructional learning strategies have recently bombarded the reading education market. (i.e., K-W-L, Ogle, 1986; Sparcs, Jones, 1985a; Reciprocal Teaching, Palincsar and Brown, 1984a,b).

Instructional research in the area of learning strategies as it pertains to reading has demonstrated that students' overall comprehension as well as their metacognitve skills can be enhanced through instruction (Schmitt, 1987; DeWitz, Carr, and Patberg 1987; Babbs, 1983; Brown and Palinscar, 1984). Although recent research has provided valuable insight regarding the

educational implications of reading strategy training, a number of issues remain unresolved. Specifically, research on learning strategies needs to be conducted within the context of the elementary classroom. Intervention needs to be integrated with instruction which involves typical classroom instructional materials in the form of prose selections. Training sessions must be of sufficient duration, providing subjects ample opportunity to practice the learned strategy. Treatment effects should be measured by more than a single dependent variable which is insufficient for determining the various subtleties of instructional intervention. In addition, investigators need to examine the effects of various person and task variables on strategy usage.

The primary purpose of the present study was to investigate the effects of training in a self-generated learning strategy on the prose-processing abilities of fourth- and sixth graders. Prose processing is defined as the ability to comprehend text and self-monitor one's understanding while engaged in strategic text processing. The study also explored the extent to which grade level and passage difficulty interacted with training to produce treatment effects.

Specifically, the study sought to answer the following research questions:

1. Is there an interaction between treatment in self-generated questioning and grade level?

2. What are the effects of training in self-generated questioning as opposed to the treated-control condition on overall criterion test scores?

3. What is the developmental relationship between grade four and grade six and overall criterion test scores?

4. Is there an interaction between training in self-generated questioning and passage difficulty for grade four?

5. Is there an interaction between treatment in self-generated questioning and passage difficulty for grade six?

Method

Experimental Design

The study was set up in three segments, each utilizing a 2x2 factorial design. The independent variable was the method of instruction and consisted of two levels, (a) training in a self-generated learning strategy, and (b) a treated-control condition. Training for the experimental group consisted of a learning strategy which encompassed self-generated questioning both (a) prior to and (b) during the reading of text. A non-questioning control group was employed to determine whether the questioning affected learning differently from training in identifying the 'main idea' of paragraphs. The between-subjects factor employed as a grouping variable was the training program in self-generated questioning. A second between-subjects variable included the condition of grade level. This variable sought to determine the relationship between grade level and self-questioning on comprehension and metacomprehension skills. Fourth- and sixth-grade-level students were utilized for these purposes.

A within-subjects factor was that of reading difficulty. Two reading passages were included in the comprehension assessment, one at an easy level and one which was difficult for the subjects involved. This attempted to determine the interaction between treatment in self-generated questioning and passage difficulty.

Subjects

The sample consisted of fourth- and sixth- graders in four classrooms in the same elementary school. The school was located in a small rural northeastern community. The median income per family was $23,625. Students were randomly assigned to classes utilized in the study.

As an additional randomization procedure, each classroom was randomly assigned to the treatment or control group. Thirty-six students (18 experimental and 18 control) from the fourth grade and thirty-six students (18 experimental and 18 control) from the sixth grade participated in the study.

Age range of the fourth-grade subjects was 9 years, 2 months, to 10 years, 3 months; 44 percent were male and 56 percent were female. Age range of the sixth-grade subjects was 11 years, 3 months, to 12 years, 9 months, with 47 percent male and 53 percent female. No minority populations were represented.

Interviews were conducted with the four classroom teachers whose students were participating in the study prior to experimenter intervention. Teachers were asked to describe the manner in which they conducted developmental reading group instruction. Essentially, all four teachers conducted lessons by stringently following guidelines from basal reader manuals. Each teacher

conducted three homogeneous developmental reading groups daily. The "high" reading groups utilized a basal one year above their current grade placement; the "average" groups read an on-grade level text; and the 'below-average" groups worked with materials one year below grade level. Teachers indicated that in their opinion all students appeared to be working at an instructional rather than a frustrational reading level. All subjects were instructed with the MacMillan reading series, 1987 edition.

Procedures

Pretesting To determine whether or not there were any initial differences in reading ability between the experimental and control groups , the Gates-MacGinitie Level D, Form 3, was administered to all subjects prior to the study. Even though individual subjects were randomly assigned, the control group at both the fourth- and sixth-grade levels scored one-half of a standard deviation higher than the experimental group. To account for this discrepancy, covariate analysis was applied to all dependent measures when the pooled within-group correlation of the dependent variable was an absolute value of .3 or above.

Training Schedule The treatment group was given ten hours of instruction utlizing a procedure called the E.T.T. (Examine The text) reading strategy. Instruction took place daily in thirty minute sessions over a period of twenty days. Each student also had an individual worktext which incorporated exercises in identifying main ideas. The treated control group received two and one half hours of instruction in identifying main ideas, and completed the

worktext identical to that of the experimental group. The remaining 7.5 hours of intervention involved reading and rereading the same passages as did the experimental group and orally discussing the answers to ten experimenter-devised main idea questions. Instruction took place during the students' regularly scheduled reading class and was experimenter provided. Worktexts were completed independently. The experimental and control groups were physically separated at all times during experimental sessions.

Instructional Procedures and Materials The E.T.T. strategy engaged students in self-generated questioning both (1) prior to and (2) during the reading of the selection. An outline of the Examine The Text procedure is presented in Appendix A.

Prior to reading, activity evolved around students' formulation of preposed questions for reading. The title and first paragraph were read and accompanying illustrations studied. The instructional leader began by asking a question such as, "Look at the title. What would you like to find out about the story?" All student-generated pre-questions were written on a chalkborad in front of the reading group. The list of questions that were devised served as student pre-questions for reading.

During reading, activities consisted of a series of response/demand events (Anderson, 1978) which took place in the context of reciprocal teaching. (Brown and Palincsar, 1984a, b).

Initially, students were directed to silently read a paragraph of the text. Immediately following silent reading, the students were asked to summarize the paragraph in one sentence that contained the main idea. If

students were unable to formulate a main idea summary statement, i.e. their statement focused on a specific detail presented in the text, the teacher intervened. First the teacher provided feedback to the child regarding his/her answer. Then, the teacher would model a main idea summary statement. The students were then instructed to construct a question by transposing the main idea statement into a main idea question. They constructed a main idea question by paraphrasing the summary statement. The students then answered the self-generated question.

Upon completion of the entire reading selection, the students referred to the pre-questions which they had self-generated to determine whether or not their purposes for reading had been met. Possible additional sources of information for those questions left unanswered were discussed at this time.

During the course of reciprocal teaching sessions the teacher acted as as on-line diagnostician, relinquishing responsibility for reading group leadership to students as she deemed appropriate. Thus a teacher-generated lesson gradually transformed into a student-generated lesson. A sample dialogue of a reciprocal teaching session is presented in Appendix B.

The Examine the Text procedure included elements of what Brown and Palincsar (1982) have termed informed and self-control training. Subjects were given the rationale of the E.T.T. learning strategy. They were told that it would help them identify the main ideas in a reading selection, better understand, and remember them.

Subjects were also told that the strategy would enable them to monitor and check their own reading comprehension. Specifically, it was explained to

subjects that if they were unable to generate a main idea summary statement, a self-generated question, or to answer a self-generated question, it could be an indication that comprehension was not progressing as it should and appropriate fix-up strategies should be applied. Fix-up strategies mentioned as possibilities were: (a) rereading the difficult portion of text, (b) reading ahead, (c) consulting an expert source such as the teacher or a parent, and (d) asking a friend for help.

Instructional Materials Instructional materials consisted of commercially developed expository reading selections and a student worktext. Selections of connected expository prose were identified from the Reader's Digest Skillbuilders (1977, Silver Edition, Reader's Digest, Inc.) for training in the E.T.T. procedure. Selections ranged from the third- to fourth-grade levels for the fourth-grade sample and the fifth- to sixth-grade levels for the sixth-grade subjects (Spache, 1953; Dale-Chall, 1948). Selections ranged from 400 to 600 words and were informational in nature. Ten main idea questions accompanied each passage and focused on information critical to the main idea of the selection.

The student worktext consisted of investigator and commercially prepared activities that provided independent practice in the identification of main ideas. Passages from Getting the Main Idea (1983, Modern Curriculum Press, Levels C & D) were utilized to provide both guided and independent practice on summarizing paragraphs. The readabilities of these paragraphs were the third and fifth grade levels as determined by the Spache (1953) and Dale-Chall (1948) readability formulas; the passages ranged from approximately 100 to 150 words

in length. The text structure of these paragraphs followed a descriptive or a problem-solution text structure. Sample exercises from the worktext are included in Appendix C.

Posttesting In order to determine whether or not treatment had in fact been manipulated, two criterion measures were administered to all subjects. The Metacomprehension Strategy Index was adapted by the experimenter from a questionnaire devised by Schmitt (1987). The index was used to determine if the Examine the Text strategy taught in the study was learned. The questionaire included twenty-five questions arranged in a multiple choice format. The MSI is presented in Appendix D.

A post-experimental interview (Schmitt, 1987) was administered to all subjects to determine the strategies students utilize to comprehend prose. The interview was administered on an individual basis and consisted of the following questions:

1. What can you do before you read a selection to prepare to help you understand it better?

2. What can you do while you are reading a selection to help you understand it better and to check on your understanding?

3. What can you do after you have read a selection to check whether or not you understood it and remembered its important parts?

Responses to the interview questions were graded via an investigator devised rating system. Each interview question was rated on a scale of zero to

four with zero indicating a low level and four indicating a high level of metacognitive awareness. Criteria for ratings were predetermined and points were awarded accordingly. Scoring reliability was obtained by the experimenter and a trained assistant independently rating responses. Initially, 80% agreement was achieved. Disagreements were settled through discussion. To ensure against experimental bias, raters were unaware of group membership when conducting analyses.

Once it was determined that treatment had in fact been manipulated, three dependent variables were administered that assessed the effect of strategy instruction on subjects' comprehension and self-monitoring skills.

To assess comprehension, the experimenter devised a criterion assessment consisting of two 600 word passages for each grade level. Fourth-graders received passages written at the third- (easy) and fourth- (difficult) grade levels. Sixth-graders received passages written at the fifth- (easy) and seventh- (difficult) grade levels. All passages were constructed from textbook-like materials which could be described as informational articles. Passages were chosen that presented information that most likely would not be part of the subjects' background knowledge. Each paragraph of all three selections began with a topic sentence,and was followed by twelve questions that tapped the main ideas and supporting details in the text. Responses were rated on a scale of zero to four based on how closely the student's response resembled experimenter-devised criteria.

All subjects received the following instructions at the beginning of the testing session: "INSTRUCTIONS": When you are finished you will be asked

twelve comprehension questions based on the reading selection. Use whatever reading strategies you have been taught which you feel will help you to remember the important information in the passage. You may have as much time as you need to complete the passage." Subjects did not state aloud or write down any of their self-generated questions, thus there was no evidence of their construction. However, after subjects in the experimental group completed their criterion reference test, the examiner asked that they recall and verbalize the questions they constructed.

The Criterion Test of Reading Comprehension was comprised of two separately scored passages. In order to compare scores between groups on the two passages, raw scores were converted into standard scores with a mean of zero and a standard deviation of one.

Scoring reliability was obtained in a manner similar to the Metacomprehension Interview, with all protocols being rated by the examiner and an assistant. Interrater agreement was calculated at 88%. The internal reliability for the criterion assessment was established using coefficient alpha (Nunnally, 1972). Reliability calculations ranged from .82 to .86 for the four passages. Content validity was determined by a panel of three college professors whose expertise is in the area of reading. Samples of the criterion assessments are included in Appendix E.

A second comprehension measure administered to all subjects was the Gates-MacGinitie reading test. This criterion measure was used to determine whether treatment effects transferred to a standardized measure of reading achievement.

The Confidence Rating Scale was devised by the experimenter to determine the subjects' ability to rate the efficacy of their reponses to the recall questions following the criterion passages. Subjects were required to rate their responses to posed questions on a scale of one to four. (1: very poor; 4: very good) Research has suggested that self-ratings of this type are one measure of self-monitoring ability. (Johnston, 1986).

An absolute accuracy score was calculated on each test item by subtracting the actual achievement score from the student's score and then calculating the absolute value. Absolute scores for all values were summed. The group means of the absolute accuracy scores for the treatment and control groups were then compared. For this particular measure, the lower numerical score was indicative of the higher level of accuracy. For example, an absolute score of four meant that the subject had misrated his response by four points. The reliability for the accuracy score attained on the confidence rating scale was computed using coefficient alpha at .86. (The Confidence Rating Scale can be found in Appendix F.)

Results and Discussion

Preliminary Analysis The mean test scores and standard deviations for each criterion variable can be found in Table 1. Statistical analyses are summarized in Table 2.

Insert Table 1 about here.

Insert Table 2 about here.

Analysis of variance revealed no interaction but significant main effects for the experimental group on the Metacomprehension Strategy Index, $F(1,18)=49.215$, p. 05, and the Metacomprehension Interview, $(F1,18)=92.556$, p 05. This indicates that treatment was in fact manipulated at both the fourth- and sixth-grade levels. Subjects in the present study were able to learn the E.T.T. strategy and appeared to gain self-insight concerning the processes they used to understand prose. Thus, the treatment manipulated strategy awareness. ANOVA also revealed significant main effects for grade level, $F(1,18)=7.423$, p .05. in favor of the sixth grade students. This may be an indication that sixth level students were more able to assimulate the subtleties of strategy instruction and/or apply them in new situations.

Qualitative analysis of the Metacomprehension Strategy Index revealed that control subjects lacked appropriate strategy awareness and focused on "superficial" strategies in an attempt to better understand text. For example, when asked for an appropriate prereading strategy, 40% of the sixth grade and 44% of the fourth grade subjects stated that they would decide how long it would take them to read the story as opposed to viewing the pictures to see what the story might be about.

Control group students also had a tendency to choose strategies which were inappropriate for the particular stage of reading on which they were being queried. When responding to another prereading question, 50% of the sixth grade and 44% of the fourth grade subjects stated that they would retell the

main points of the selection. This is inappropriate at the prereading stage. These findings substantiate Schmitt's (1987) results.

Similar results were obtained on the Metacomprehension Interview. For example fourth graders identified behaviors such as finding the correct page, finding a quiet place, and putting other materials away, as appropriate "prereading" strategies. Sample "during reading" behaviors included ignoring distractions, reading slowly, and looking up the hard words. Fourth grade controls also relied on outside assistance for "after reading" activities. They stated that they had to ask someone to ask them questions and/or answer the teacher's questions to assess their story understanding. Sixth grade responses were surprisingly similar with the exception of the postreading stage, at which point 50% of the subjects stated that they would reread for important details.

The remainder of the analyses investigated whether or not increased strategy awareness resulted in increased prose processing abilities.

Analysis 1 The first three research questions were explored using three univariate analyses, one for each dependent variable. The separate analyses were required because each dependent variable measured a different aspect of training.

The mean test scores and standard deviations for each dependent variable in Analysis 1 can be found in Table 3. Results of the statistical analyses for this segment of the study are summarized in Table 4.

Insert Table 3 about here

Insert Table 4 about here

The results of both analysis of covariance and analysis of variance reveals that the treatment by grade level interaction was found to be non-significant for all three dependent measures.

Analysis of covariance revealed significant main effects for the Criterion Reference Test (passage readability grade 5) in favor of the experimental groups $F(1,67)=34.708, p < .05$. In this study, training in self-generated questioning appeared to positively affect subjects' prose processing of expository text. However, there was no significant difference between treatment and control groups on the Gates-MacGinitie standardized reading test, hence treatment effects did not appear to transfer to a standardized test of reading achievement, at the fourth grade level. The results of the Gates-MacGinitie standardized reading at the sixth grade level are highly suspect.

A murder-suicide, which resulted in the deaths of three elementary aged children at Geneseo Central School, occurred two days prior to the Gates test administration to the sixth grade. The investigator feels that this tragedy may have affected the results obtained on the Gates-MacGinitie at the sixth grade level.

There was no significant difference between experimental and control groups on the accuracy of the confidence rating scale at the .05 level. This

may indicate that although strategy awareness may (a) increase student's strategy awareness, (b) develop student's understanding of the reading process, and (c) increase students' comprehension and retention of prose, it may not increase their ability to self-monitor their comprehension of text.

To evaluate the developmental relationship between grade four and grade six and overall criterion test scores, analysis of covariance was employed. The ANCOVA was significant, $F(1.67)=34.08$, p. 05, on the criterion grade five passage, in favor of the sixth grade level.

This is not surprising since past research has indicated that older and better readers are more developed in their metacomprehension skills. (DiVesta, Hayward and Orlando,1979; Ackerman, 1982; Winograd and Johnston, 1980). ANCOVA also indicated a statistically signficant difference on the Gates-MacGinitie $F(1,6)=3.960$, p .05, in favor of the fourth grade level. This unexpected result is most likely attributed to the murder-suicide tragedy that has been previously described.

Analysis 2 ANOVA was employed to determine whether or not there would be an interaction between treatment in self-generated questioning and passage difficulty for grade four. ANOVAS were non-significant for both the criterion measure and the confidence rating scales.

Analysis 3 ANOVA results were similar in testing for an interaction between treatment in self-generated questioning and passage difficulty for subjects at the sixth grade level. ANOVA did not yield a treatment by passage difficulty interaction for the criterion measure or the Confidence Rating Scale. Descriptive statistics for analysis two and analysis three are presented in Table 5. Statistical data analyses are found in Table 6 and Table 7.

Insert Table 5 about here

Insert Table 6 about here

Insert Table 7 about here

Conclusion

Several implications for reading instruction can be drawn from this study. Treatment did manipulate metacomprehension skills and resulted in increased comprehension and retention of prose as measured by the Metacomprehension Strategy Index, the Metacomprehension Interview and the Criterion Assessment.

These skills are integral factors that constitute what has been defined in the present study as efficient prose processing skills.

Improvements cannot be attributed to factors such as the teacher variable, initial differences in the ability level of the students, or the time of day of instruction. These factors, which commonly confound the results of instructional research were held constant in this study. Thus, the learning strategy employed has merit and may prove to be a valuable instructional alternative to the traditional Directed Reading Activity when children are engaged in reading expository text.

The expectation that strategy training can increase one's ability to self-monitor their reading comprehension is questionable. Elementary-aged students, like some adults, are not always cognizant of their degree or lack of understanding. On the surface these results appear surprising given the current abundance of metacognitive articles attesting to the self-monitoring fostering components of various metacognitive learning strategies. Paris (1987) has found that 50% of the articles published on metacognition since 1981 were presented in essay format consisting of advice to teachers. The overwhelming number of articles are not empirical in nature. It appears that the translation of metacognitive theory into instructional practice is being done without an existing empirical data base.

Educators must be realistic as to the constraints of strategy training. Specifically, one needs to think of the cognitive capacity of their students, their prior background knowledge, the goals of instruction and the content of

the materials. All of these variables interact with strategy training to produce varied results.

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Appendix A

The E.T.T. Procedure: Examine the Text

I. Before reading activities

- Closely examine the title and the illustrations of the selection.
- Read the first paragraph of the selection silently.
- Ask yourself, "What do I want to find out as I read this selection?
- Make a list of the questions you want answered.

II. During reading activities

- Read the second paragraph silently.
- Identify the topic of the paragraph in a word or phrase.
- State the main idea of the paragraph in one summary statement.
- Turn the main idea summary statement into a main idea question.
- Answer your question.
- Go on to the next paragraph and repeat the procedure.

III. After reading activities

- Look back at your pre-questions for reading.
- Try to answer your pre-questions. Look back in the reading selection if necessary.
- Review story materials by trying to remember and answer the main idea questions you made up while you read the story.
- If the story did not answer some of your pre-questions you may want to find the answers yourself by doing research in the library.

Appendix B

Sample Dialogue: Reciprocal Teaching Procedure

E: Look at the title of the story. Carrie what is the title?

C: Spider! 8 legged Wonder of the World.

E: Very Good. The next thing you are going to do is to ask yourself, with a title like Spiders - 8 Legged Wonders of the World what are some of the quest this story might answer for you? Raise your hand if you have an idea.

M.C.: What are the spiders?

E: Do you mean what kinds of spiders are in the story?

M.C.: Yes, What kinds of spiders will we learn about?

O.K. Jill?

J: How do they catch their food?

E: Christen?

C.W.: Do all spiders spin webs?

E: Good question. All right. Kyle Roach.

K.R.: How many eyes do spiders have?

E: O.K. Any other questions? Sasha?

S.V.: What kinds of spiders are there?

E: O.K. That's the same as question #1. Can you see that your question has already been asked?

S.V.: Oh, yeah. (He laughs)

C: What do they do?

E: Be more specific?

C: What are their jobs? Like what do they do to catch their food? What are their jobs?

E: O.K. Hurry?

M.C.: How many kinds of spiders are there?

E: Now let's read our questions again.
What kinds of spiders are in the story?
How do spiders catch their food?
Do all spiders spin webs?
How many eyes does the spider have?
What are some jobs that the spider must do?
How many different kinds of spiders are there?

E: Any more?

M.P.: How many insects does a spider catch in a day?

E: All right. Very good.
We will stop with our questions for now. These questions give you purposes for reading. They tell what you want to find out as you read today's story." We will see if you can answer these questions after you have finished reading. Now, we have been learning how to read paragraphs and figure out what the main ideas are. We have also been learning how to be teachers. Today we are going to put those two activities together to help us to remember the main ideas of this selection.
What I would like you to do to start out with is to read the first paragraph silently and stop when you are done.

E: "I am going to be the first teacher. Listen to what I do so when it is your turn to be the teacher you can do it too.
This paragraph is most about a spider which is a marvelous creature. My question is - I am going to take that Main idea sentence and turn it into a question, "What makes the spider a marvelous creature?" Nicholas?"

N: It has 8 eyes and 8 legs.

E: Very good. Sasha, what else?

S: It's got a fancy web.

E: All right! O.K. What else makes the spider a marvelous creature? Jill?

J: It can't see very well.

E: Good work. Even though it has 8 eyes it can't see very well.
What else did they say was special about the spider?

J: His sense of touch.

E: Very good. I want you to remember those are all qualities that make the spider a marvelous creature. Read the rest of the page to yourself and I will choose one of you to be the teacher.

---- (silent reading)

E: Mr. Piper - be our first teacher. The first thing you have to do is to tell us the main idea of that paragraph.

M.P.: The spider's web.

E: O.K. What about it? The spider's web is (<u>what</u>)?

M.P.: It is an amazing work of art.

E: Good for you. Would you ask us a question then about that main idea?

N.P.: ----E: It could start with the word, "Why?"

N.P.: ----E: You could take your sentence and turn it right into a question. Why is the spider's web a _____.

N.P.: So nice

E: All right. Good. Now ask that question to one of us.

N.P.: Why is the spider's web such an amazing work of art?

M: No response

E: All right. What does it tell us in the paragraph? Why is the spider's web an amazing work of art?

M: It's strong for it's size?

E: Very good. It is very thin but it is very strong, and that's what makes it an amazing work of art. Because even though there's nothing to it, put together those lines are very very strong. All right. Read the next paragra to page 23. Stop at the word straw.

E: Let's see whose ready.
Kyle Roach.

K.R.: ----E: Can you tell us the main idea of that paragraph? What's that about?

K.R.: The spider capturing its prey.

E: All right. Very good. Can you turn that into a question?

K.R.: How do spiders catch their prey?

E: Good. Good question.

K.R.: Phil?

P.M.: Um - They spin a web and Um - sacs around them, they bit em.

E: With what kind of a bite.

P.M.: With a poisonous bite.

E: Good. And after they do that what do they do to their prey?

P.M.: They eat it - They suck it dry.

E: Until what's left?

P.M.: Just the shell?

E: (to Kyle) Do you accept that answer?

Appendix C

Sometimes a paragraph gives us information that describes something like an animal, a special place, or a game. For paragraphs that provide us with different types of information, we can find the main idea by answering the question, "What is this paragraph about?" and "What is special about the topic?"

Read the following paragraph. Complete the sentence following the paragraph to determine the main idea.

Leopards live only in certain places. They like to be near streams and rivers so that they have water to drink. Leopards usually live in trees and bushes. The leopards hide in the trees and bushes when they hunt. Leopards like warm places. Some parts of Africa are just right for leopards. They can find warmth, bushes, rivers, and streams.

This paragraph is about _____. They are special because they only live in certain _____.

Now try another one:

Dolphins are very clever animals. They can learn many tricks. They can ring a bell hung high over the water. They can jump through hoops. They can walk across the water on their tails. They can be taught to put on funny hats and push things around in the water. They can even leap high out of the water and take a fish from the mouth of their trainer. Some people think that dolphins are smarter than dogs or monkeys. It is just possible that someday people and dolphins may be able to talk to each other.

This paragraph is most about _____. They are special because they are very _____ animals.

Read the following paragraphs. When you are completed, write one sentence that tells the main idea for each paragraph. Remember when reading an article that gives information about something other than a person, you can find the main idea by answering the questions, "What is this paragraph about?" and "What is special about the topic?"

Everyone knows that fish can swim. But there is a special kind of fish that can also "walk." The walking catfish can leave the water and still live. Sometimes a walking catfish gets tired of swimming in its pond. Then it can jump out and walk to a new one. The fish has its own strange way of walking. It hops out of the water. It bends its back, drags its tail forward, and flops toward where it wants to go. The fish can keep up this "walking" until it reaches a new pond. Once in the new pond, a walking catfish swims again.

The main idea of this paragraph is _____
_____
_____.

Bigfoot is a mysterious animal that is supposed to live deep in the woods. Some people think it lives in the northwestern part of the United States. Bigfoot has also been reported in

Appendix D

Metacomprehension Strategy Index

DIRECTIONS: Think about what kinds of things you can do to help you understan a story better before, during, and after you read it. Read each of the lists of four statements and decide which one of them would help you the most. There are no right answers. It is just that you think would help the most. Circle the letter of the statement you choose.

I. In each set of four, choose the one statement which tells a good thing to do to help you understand a story better B E F O R E you read it.

1. Before I begin reading, it's a good idea to:
   a. See how many pages are in the story.
   b. Look up all of the big words in the dictionary.
   c. Make some guesses about what I think will happen in the story.
   d. Think about what has happened so far in the story.

2. Before I begin reading, it's a good idea to:
   a. Look at the pictures to see what the story is about.
   b. Decide how long it will take me to read the story.
   c. Sound out the words I don't know.
   d. Check to see if the story is making sense.

3. Before I begin reading, it's a good idea to:
   a. Ask someone to read the story to me.
   b. Read the title to see what the story is about.
   c. Check to see if most of the words have long or short vowels in them.
   d. Check to see if the pictures are in order and make sense.

4. Before I begin reading, it's a good idea to:
   a. Check to see that no pages are missing.
   b. Make a list of the words I'm not sure about.
   c. Use the title and pictures to help me make guesses about what will happen in the story.
   d. Read the last sentence so I will know how the story ends.

5. Before I begin reading, it's a good idea to:
   a. Decide on why I am going to read the story.
   b. Use the difficult words to help me make guesses about what will happen in the story.
   c. Reread some parts to see if I can figure out what is happening if things aren't making sense.
   d. Ask for help with the difficult words.

6. Before I begin reading, it's a good idea to:
   a. Retell all of the main points that have happened so far.
   b. Ask myself questions that I would like to have answered in the story.
   c. Think about the meanings of the words which have more than one meaning.
   d. Look through the story to find all of the words with three or more syllables.

7. Before I begin reading, it's a good idea to:
   a. Check to see if I have read this story before.
   b. Use my questions and guesses as a reason for reading the story.
   c. Make sure I can pronounce all of the words before I start.
   d. Think of a better title for the story.

8. Before I begin reading, it's a good idea to:
   a. Think of what I already know about the things I see in the pictures.
   b. See how many pages are in the story.
   c. Choose the best part of the story to read again.
   d. Read the story aloud to someone.

9. Before I begin reading, it's a good idea to:
   a. Practice reading the story aloud.
   b. Retell all of the main points to make sure I can remember the story.
   c. Think of what the people in the story might be like.
   d. Decide if I have enough time to read the story.

10. Before I begin reading, it's a good idea to:
    a. Check to see if I am understanding the story so far.
    b. Check to see if the words have more than one meaning.
    c. Think about where the story might be taking place.
    d. List all of the important details.

* * * *

11. In each set of four, choose the one statement which tells a good thing to do to help you understand a story better W H I L E you are reading it.

11. While I'm reading, it's a good idea to:
    a. Read the story very slowly so that I will not miss any important parts.
    b. Read the title to see what the story is about.
    c. Check to see if the pictures have anything missing.
    d. Check to see if the story is making sense by seeing if I can tell what's happened so far.

12. While I'm reading, it's a good idea to:
    a. Stop to retell the main points to see if I am understanding what has happened so far.
    b. Read the story quickly so that I can find out what happened.
    c. Read only the beginning and the end of the story to find out what it is about.
    d. Skip the parts that are too difficult for me.

13. While I'm reading, it's a good idea to:
    a. Look all of the big words up in the dictionary.
    b. Put the book away and find another one if things aren't making sense.
    c. Keep thinking about the title and the pictures to help me decide what is going to happen next.
    d. Keep track of how many pages I have left to read.

14. While I'm reading, it's a good idea to:
    a. Keep track of how long it is taking me to read the story.
    b. Check to see if I can answer any of the questions I asked before I started reading.
    c. Read the title to see what the story is going to be about.
    d. Add the missing details to the pictures.

15. While I'm reading, it's a good idea to:
    a. Have someone read the story aloud to me.
    b. Keep track of how many pages I have read.
    c. List the story's main character.
    d. Check to see if I can make summary statements on what I have read.

16. While I'm reading, it's a good idea to:
    a. Check to see that the characters are real.
    b. Ask myself questions about what I have read so far to see if I understand the story.
    c. Not look at the pictures because they might confuse me.
    d. Read the story aloud to someone.

17. While I'm reading, it's a good idea to:
    a. Try to answer the questions I asked myself.
    b. Try not to confuse what I already know with what I'm reading about.
    c. Read the story silently.
    d. Check to see if I am saying the new vocabulary words correctly.

18. While I'm reading, it's a good idea to:
    a. Try to see if my answers to my questions are right or wrong.
    b. Reread to be sure I haven't missed any of the words.
    c. Decide on why I am reading the story.
    d. List what happened first, second, third, and so on.

19. While I'm reading, it's a good idea to:
    a. To see if I can recognize the new vocabulary words.
    b. Be careful not to skip any parts of the story.
    c. Check to see how many of the words I already know.
    d. Keep thinking of what I already know about the things and ideas in the story to help me decide what is going to happen.

20. While I'm reading, it's a good idea to:
    a. Reread some parts or read ahead to see if I can figure out what is happening if things aren't making sense.
    b. Take my time reading so that I can be sure I understand what is happening.
    c. Change the ending so that it makes sense.
    d. Check to see if there are enough pictures to help make the story ideas clear.

* * * *

III. In each set of four, choose the one statement which tells a good thing to do to help you understand a story better A F T E R you have read it.

21. After I've read a story, it's a good idea to:
    a. Count how many pages I read with no mistakes.
    b. Check to see if there were enough pictures to go with the story to make it interesting.
    c. Check to see if I met my purpose for reading the story.
    d. Underline the causes and effects.

22. After I've read a story, it's a good idea to:
    a. Underline the main idea.
    b. Retell the main points of the whole story so that I can check to see if I understood it.
    c. Read the story again to be sure I said all of the words right.
    d. Practice reading the story aloud.

23. After I've read a story, it's a good idea to:
    a. Read the title and look over the story to see what it is about.
    b. Check to see if I skipped any of the vocabulary words.
    c. Check to see if I can answer the prequestions I set for reading.
    d. Make a guess about what will happen next in the story.

24. After I've read a story, it's a good idea to:
    a. Look up all of the big words in the dictionary.
    b. Read the best parts aloud.
    c. Have someone read the story aloud to me.
    d. Think about how the story was like things I already knew about before I started reading.

25. After I've read a story, it's a good idea to:
    a. Read the story aloud.
    b. Practice reading the story silently for practice of good reading.
    c. Look over the story title and pictures to see what will happen.
    d. Practice answering the questions that I made up throughout the story to help me remember what I read.

Appendix E

Criterion Test of Reading Comprehension

Directions: Read the following story silently. When you are finished, you will be asked ten comprehension questions based on the reading selection. You will be given a piece of scrap paper for the text. You may use it in any way that will be helpful to you.

The polar bear is one of the largest and strongest of meat-eating animals. He is found only in the Arctic. When grown, he weighs up to 1600 pounds. With his long, heavy body and narrow head he looks clumsy, but he can move very fast and easily.

The polar bear can move easily in the water. Most animals have to paddle hard to stay afloat, but the polar bear can lie still in the water for a long time. Air spaces in his fur as well as an oily skin and a thick layer of fat help him to float.

The bear has many body parts which help to protect him. He has special "sunglasses" - a third eyelid that protects his eyes from the shine of ice and snow. His toes are partly webbed to help him swim. Hair on the bottom of his feet helps him to walk on ice without slipping. His claws are sharp as a cat's.

A polar bear can make sounds to communicate. He hisses like a cat when he is angry. When he is badly hurt he roars, but usually he is as quiet as the snow around him.

Along with the polar bear's great strength goes a keen sense of smell. He can smell seal fat from 20 miles away! Seals are the polar bear's favorite food. Hunters sometimes burn seal fat to attract a bear near enough to shoot him.

The polar bear's black nose is a problem. It is the only part of his body which can be seen against the white snow and ice. To hide it, he sometimes covers it with a paw when he is hunting.

The polar bear himself is a skillful hunter. In the fall he moves south with the sun. In the spring he starts north, staying on the ice but along the coast. There he can find seal.

In his travels, the polar bear follows the movement of tiny sea animals, called krill. The bear is always on the move and may travel up to 75 miles in a week to follow these little sea animals. Krill stay near the melting edges of icebergs, because they need to live in water that is not too salty. Fish feed on the krill. Seals eat the fish and bears eat the seals!

The polar bear has a method for catching seals. It waits for seals to pop their heads through breathing holes in the ice. Most kinds of arctic seal stay under water for nine minutes, then come up for 45 seconds to breathe. A waiting bear can flip a seal out of the water with one swish of his huge paw and kill it with a single bite.

The polar bear is a clever hunter. When the sun shines, a seal may come up onto the ice to lie beside a breathing hole. It lifts its head whenever it feels danger is near - but the polar bear slowly slides toward it, moving only when the seal's head is down. Finally he is close enough to spring and grab the seal.

The only animals the polar bear needs to fear, besides man, are the killer whale and the walrus. Killer whales catch bears under water. The walrus, three times as big as the bear, can swim faster than the bear and drown him. But the walrus is stupid and the bear is smart. Eskimos have seen a polar bear sneak up on a sleeping walrus and smash its head with a block of ice!

The female polar bear is a good mother. When she is three or four years old, she mates in the spring. Her cubs are born the next January. Their den is a hollow in ice or snow. A mother bear stays in her den with

the cubs until April. She does this even though polar bears do not hibernate in winter. She feeds her cubs through the winter, cuddling them to her warm fur. She keeps the cubs with her for two years, teaching them how to hunt.

Although the natural lifetime of a polar bear is about 25 years, he is not likely to live that long today. Man is killing him off. Zoos will pay about $500 for a cub. Hunters get about $200 for a polar bear skin. Now scientists guess that there are only about 25,000 polar bears left in the world.

Polar bears are in danger. Some countries allow the shooting of polar bears. Some do not. But each year the bears travel far, crossing from country to country. They are in danger so long as <u>any</u> country allows hunters to kill them.

Questions

1. Why do you suppose the polar bear is such a good swimmer?

2. You are taking a walk in the Arctic and you see a polar bear. Describe the way he looks based on the new information presented in this selection.

3. Name three body parts of the polar bear which help to protect him. Explain how each body part helps.

4. How does a polar bear communicate his feelings to others?

5. What special qualities make the polar bear a good hunter?

6. What part of the polar bear's body is a problem for him? Why?

7. How does the polar bear's good sense of smell sometimes work against him?

8. How does the polar bear find and catch its food?

9. What three animals does the polar bear need to fear? Why?

10. What is the natural lifetime of a polar bear? Is it likely to live that long? Why or why not?

11. The polar bear has been described as a clever animal. Give some examples of his cleverness.

12. Where are two places you might go in order to see a polar bear?

Table 1

Preliminary Analysis - SUMMARY TABLE - Descriptive Statistics
N = 72

Test Name	Experimental Group Means		Experimental Group Standard Deviations		Control Group Means		Control Group Standard Deviations	
	n=18	n=18	n=18	n=18	n=18	n=18	n=18	n=18
	Gr. 4	Gr. 6	Gr. 4	Gr. 6	Gr. 4	Gr. 6	Gr. 4	Gr. 6
Metacomprehension Index	75.33	81.56	16.42	11.07	43.72	58.67	18.44	18.81
Metacomprehension Interview	8.17	7.78	2.26	2.13	3.17	3.50	1.50	2.20

Table 2

Preliminary Analysis - SUMMARY TABLE - Statistical Analysis

ANALYSIS OF VARIANCE

	Source	SS	df	MS	F
Metacomprehension Strategy Index	Treatment	13366.125	1	13366.125	49.215*
	Grade level	2016.125	1	2016.125	7.423*
	Treatment x Grade level	342.368	1	342.368	1.261
	Error	18468.055	68	271.589	
Metacomprehension Interview	Treatment	387.347	1	387.347	92.556*
	Grade level	.014	1	.014	.003
	Treatment x Grade level	2.347	1	2.347	.561
	Error	284.611	68	4.185	

*significant at .05 level

Table 3

ANALYSIS ONE - SUMMARY TABLE - Descriptive Statistics
N = 72

Test Name	Experimental Group Means		Experimental Group Standard Deviations		Control Group Means		Control Group Standard Deviations	
	n=18	n=18	n=18	n=18	n=18	n=18	n=18	n=18
	Gr. 4	Gr. 6	Gr. 4	Gr. 6	Gr. 4	Gr. 6	Gr. 4	Gr. 6
Gates-MacGinitie	33.05	29.26	5.45	6.09	30.37	28.71	8.32	6.41
Criterion 5	32.16	39.10	10.39	3.75	23.58	24.82	9.15	9.32
Accuracy of Confidence Rating**	6.89	7.28	4.36	4.17	9.94	7.72	3.95	4.04

**Due to the nature of this assessment, the lower score was indicative of the higher level of accuracy.

Table 4

ANALYSIS ONE - SUMMARY TABLE - Statistical Analysis

Dependent Variable	Source	SS	df	MS	F
ANALYSIS OF COVARIANCE					
Criterion Assessment - Level 5	Treatment	2290.891	1	2290.891	36.708*
	Grade level	256.756	1	256.756	3.890*
	Treatment x Grade level	125.199	1	125.199	1.897
	Error	4422.325	67	66.005	
Gates-MacGinitie Standardized Reading Test	Treatment	42.305	1	42.305	2.311
	Grade level	72.477	1	72.477	3.960*
	Treatment x Grade level	20.593	1	20.593	1.125
	Error	1226.225	67	18.302	
ANALYSIS OF VARIANCE					
Accuracy of Confidence Rating	Treatment	55.125	1	55.125	3.226
	Grade Level	15.125	1	15.125	.885
	Treatment x Grade level	30.681	1	30.681	1.796
	Error	1161.944	68	17.087	

*significant at .05 level

Table 5

ANALYSIS TWO - Descriptive Statistics

Test Name	Experimental Group Means - Grade 4 Easy Reading Level		Difficult Reading Level		Control Group Means - Grade 4 Easy Reading Level		Difficult Reading Level	
	Group Mean	Group S.D.	Group Mean	Group S.D.	Group Mean	Group S.D.	Group Mean	Group S.D.
*Criterion Test	.53	.85	.52	.92	-.53	-.87	-.52	.80
Confidence Rating	7.83	4.46	6.89	4.36	8.61	3.11	6.89	4.36

ANALYSIS THREE - Descriptive Statistics

Test Name	Experimental Group Means - Grade 4 Easy Reading Level		Difficult Reading Level		Control Group Means - Grade 4 Easy Reading Level		Difficult Reading Level	
	Group x̄	Group S.D.	Group x̄	Group S.D.	Group x̄	Group S.D.	Group x̄	Group S.D.
*Criterion Test	.81	.39	.80	.56	-.81	.97	-.80	.90
Confidence Rating Scale	7.28	4.17	8.89	3.82	7.72	4.06	9.39	2.65

*Reported in Standard Scores within grade level ($\bar{x} = 0$, $s = 1$)

Table 6

ANALYSIS TWO - SUMMARY TABLE - Statistical Analysis
GRADE FOUR

ANALYSIS OF VARIANCE

Dependent Variable	Source	SS	DF	MS	F
Criterion Test	Treatment x Passage Difficulty	.048	1	.048	.014
	Error	120.695	34	3.550	
Confidence Rating Scale	Treatment x Passage Difficulty	2.722	1	2.722	.134
	Error	692.278	34	20.361	

Table 7

ANALYSIS THREE - SUMMARY TABLE - Statistical Analysis
GRADE SIX

ANALYSIS OF VARIANCE

Dependent Variable	Source	SS	DF	MS	F
Criterion Test	Treatment x Passage Difficulty	.149	1	.149	.015
	Error	339.434	34	9.983	
Confidence Rating Scale	Treatment x Passage Difficulty	.014	1	.014	.000
	Error	513.139	34	15.092	